

20. Apparatus, as claimed in line 19, further comprising a plurality of shadow registers wherein data stored in the memory at a first storage time is also stored in at least one of the plurality of shadow registers substantially simultaneously with the first storage time.

21. Apparatus, as claimed in claim 19, wherein the updatable table comprises an updatable transmit table and updatable receive table, and wherein the memory includes at least a transmit holding memory for holding data for updating the updatable transmit table and a receive holding memory, different from the transmit holding memory, for holding data for updating the updatable receive table.

22. Apparatus, as claimed in claim 19, wherein the updatable table comprises a switch table.

23. Apparatus, as claimed in claim 19, wherein the updatable table comprises a routing table.

24. Apparatus, as claimed in claim 19, wherein the updatable table controls the routing of isochronous data, non-isochronous data, or a combination of isochronous data and non-isochronous data, on a bus.

25. Apparatus, as claimed in claim 24, wherein the isochronous data comprises telephony data, video data, or a combination of telephony data and video data.

26. Apparatus, as claimed in claim 24, wherein the non-isochronous data comprises packet data.

27. Apparatus, as claimed in claim 24, wherein the non-isochronous data comprises Ethernet data.

28. Apparatus, as claimed in claim 24, wherein the non-isochronous data comprises non-packet, non-isochronous data.

29. Apparatus, as claimed in claim 24, wherein the non-isochronous data comprises ATM data.

30. Apparatus, as claimed in claim 24, wherein the bus comprises a time division multiplexed bus.

31. Apparatus, as claimed in claim 24, wherein the bus comprises a time slot interchange bus.

32. Apparatus, as claimed in claim 24, wherein the bus comprises a bus for carrying ATM, SONET or 1394 data.

33. Apparatus, as claimed in claim 24, wherein the bus connects multiple hubs in the system.

34. Apparatus, as claimed in claim 19, wherein the memory comprises a register.

35. (amended) Apparatus, as claimed in claim 19, wherein the memory comprises a random access memory (RAM).

36. Apparatus, as claimed in claim 19, wherein the memory comprises a multi-port memory.

37. Apparatus, as claimed in claim 19, wherein update data is transferred to the memory in the form of a burst.

38. Apparatus, as claimed in claim 19, wherein the updatable table operates synchronously with a second clock.

39. Apparatus, as claimed in claim 38, wherein the second clock comprises a network reference clock.

40. Apparatus, as claimed in claim 39, wherein the network reference clock comprises a WAN reference clock.

41. Apparatus, as claimed in claim 39, wherein the network reference clock comprises a LAN reference clock.

42. Apparatus, as claimed in claim 19, wherein the updatable table controls a hub in the system.

43. Apparatus, as claimed in claim 42, wherein the hub comprises a PBX.

44. Apparatus, as claimed in claim 42, wherein the hub includes multiple LAN connections.

45. Apparatus, as claimed in claim 42, wherein the hub includes multiple isochronous switching devices.

46. Apparatus, as claimed in claim 42, wherein the hub includes multiple Ethernet connections.

47. Apparatus, as claimed in claim 42, wherein the hub is coupled to multiple nodes.

48. Apparatus, as claimed in claim 47, wherein each of the nodes transfers isochronous data, non-isochronous data, or a combination of isochronous data and non-isochronous data, in the system under control of the updatable table.

49. Apparatus, as claimed in claim 19, wherein data transfer in the system is controlled so that bandwidth for isochronous data transfers is insensitive to a level of non-isochronous data transfers in the system.

50. Apparatus, as claimed in claim 19, wherein data transfer in the system is controlled so that bandwidth for non-isochronous data transfers is insensitive to a level of isochronous data transfers in the system.

51. Apparatus, as claimed in claim 19, wherein operations that the processor handles includes call control, signaling, maintenance activities, status processing, and error bookkeeping.

52. Apparatus, as claimed in claim 19, wherein the update data comprises data transmitted over a D channel.

53. In a computer-controlled system having a processor operating according to a clock and an updatable table operating asynchronously with the clock, the updatable table outputting control data for controlling data transfers in the system, a method, comprising:

receiving update data in a memory from the processor during a first time period and outputting the update data to the updatable table; and

determining the beginning of a second period of time during which the updatable table is not being used and updating the updatable table during the second period of time, asynchronously with the clock, using at least some of the update data.

54. A method, as claimed in claim 53, wherein the update data includes at least one control word, indicating a table update location, and at least one data word, including data to be stored at the update location.

55. A method, as claimed in claim 54, wherein the update data includes more data words than control words.

56. A method, as claimed in claim 55, further comprising the step of incrementing the control word by a first amount to provide a new table update location for a subsequent table update.

57. (amended) A method, as claimed in claim 56, wherein the first amount is programmable.

58. A method, as claimed in claim 53, wherein the update data includes a plurality of words, each of the plurality of words having at least one bit indicating whether the word is a control word or a data word.

59. A method, as claimed in claim 53, wherein the update data includes a plurality of words, each of the plurality of words having at least one bit indicating whether the word is the last data word of the update data.

60. A method, as claimed in claim 53, further comprising the step of notifying the processor when the table update is complete.

61. A method, as claimed in claim 60, wherein the step of notifying comprises sending an interrupt to the processor.

62. A method, as claimed in claim 60, wherein, after the processor has written the update data into the memory, the processor is prevented from writing further data into the memory until after the step of notifying.

63. A method, as claimed in claim 53, wherein the updatable table comprises a switch table.

64. A method, as claimed in claim 53, wherein the updatable table comprises a routing table.

65. A method, as claimed in claim 53, wherein the updatable table controls the routing of isochronous data, non-isochronous data, or a combination of isochronous data and non-isochronous data, on a bus.

66. A method, as claimed in claim 65, wherein the isochronous data comprises telephony data, video data, or a combination of telephony data and video data.

67. A method, as claimed in claim 65, wherein the non-isochronous data comprises packet data.

68. A method, as claimed in claim 65, wherein the non-isochronous data comprises Ethernet data.

69. A method, as claimed in claim 65, wherein the non-isochronous data comprises non-packet, non-isochronous data.

70. A method, as claimed in claim 65, wherein the non-isochronous data comprises ATM data.

71. A method, as claimed in claim 65, wherein the bus comprises a time division multiplexed bus.

72. A method, as claimed in claim 65, wherein the bus comprises a time slot interchange bus.

73. A method, as claimed in claim 65, wherein the bus comprises a bus for carrying ATM, SONET or 1394 data.

74. A method, as claimed in claim 65, wherein the bus connects multiple hubs in the system.

75. A method, as claimed in claim 53, wherein the memory comprises a register.

76. (amended) A method, as claimed in claim 53, wherein the memory comprises a random access memory (RAM).

77. A method, as claimed in claim 53, wherein the memory comprises a multi-port memory.

78. A method, as claimed in claim 53, wherein update data is transferred to the memory in the form of a burst.

79. A method, as claimed in claim 53, wherein the updatable table operates synchronously with a second clock.

80. A method, as claimed in claim 79, wherein the second clock comprises a network reference clock.

81. A method, as claimed in claim 80, wherein the network reference clock comprises a WAN reference clock.

82. A method, as claimed in claim 80, wherein the network reference clock comprises a LAN reference clock.

83. A method, as claimed in claim 53, wherein the updatable table controls a hub in the system.

84. A method, as claimed in claim 83, wherein the hub comprises a PBX.

85. A method, as claimed in claim 83, wherein the hub includes multiple LAN connections.

86. A method, as claimed in claim 83, wherein the hub includes multiple isochronous switching devices.

87. A method, as claimed in claim 83, wherein the hub includes multiple Ethernet connections.

88. A method, as claimed in claim 83, wherein the hub is coupled to multiple nodes.

89. A method, as claimed in claim 88, wherein each of the nodes transfers isochronous data, non-isochronous data, or a combination of isochronous data and non-isochronous data, in the system under control of the updatable table.

90. A method, as claimed in claim 53, wherein data transfer in the system is controlled so that bandwidth for isochronous data transfers is insensitive to a level of non-isochronous data transfers in the system.

91. A method, as claimed in claim 53, wherein data transfer in the system is controlled so that bandwidth for non-isochronous data transfers is insensitive to a level of isochronous data transfers in the system.

92. A method, as claimed in claim 53, wherein operations that the processor handles includes call control, signaling, maintenance activities, status processing, and error bookkeeping.

93. A method, as claimed in claim 53, wherein the update data comprises data transmitted over a D channel.

94. (amended) Apparatus for communicating between at least first and second stations in a data communication system over at least a first link, the data communication system including a plurality of data sources and sinks, at least a first of the sources and sinks configured to receive or transmit data isochronously and a second of the sources and sinks configured to transmit data non-isochronously, the apparatus comprising:

at least a receiver and at least a first transmitter in the first station;

the first link coupling the first station with the second station;

the second station being coupled to both the first and second of the sources and sinks;

a second transmitter in the second station for transmitting data to the first receiver;

a first multiplexer in the second station for permitting the transmitting of data from both of the first and second sources and sinks over the first link as first multiplexed data, the

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multiplexer providing a first bandwidth for first data originating from an isochronous source,  
including at least the first of the sources and sinks;

at least a first updatable switch table in the first station for storing information indicating  
at least the destination of data;

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a processor operating according to a first clock, coupled to the updatable switch table, the  
updatable switch table operating according to a second clock asynchronously with the first clock;

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a memory coupled to the processor receiving update data from the processor during a first  
time period and coupled to the first updatable switch table and outputting the update data to the  
first updatable switch table.

95. Apparatus, as claimed in claim 94, wherein data transfer in the system is  
controlled so that bandwidth for isochronous data transfers is insensitive to a level of non-  
isochronous data transfers in the system.

96. Apparatus, as claimed in claim 94, wherein data transfer in the system is  
controlled so that bandwidth for non-isochronous data transfers is insensitive to a level of  
isochronous data transfers in the system.

97. A method for communicating data over a data link in a data communication  
system between a first station coupled to a first endpoint of the data link and a second station  
coupled to a second endpoint of the data link, the second station having an isochronous data  
source, a non-isochronous data source or both an isochronous data source and a non-isochronous  
data source, the data communication system having a time-varying amount of non-isochronous  
demand, the method comprising;

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time-division multiplexing data from the isochronous data source and/or the non-  
isochronous data source, wherein a first bandwidth is allocated for data from the isochronous  
source, wherein the data transfer rate for the isochronous data is substantially independent of the  
non-isochronous demand on the data system;

providing a processor in the first station operating according to a first clock and an  
updatable table operating according to a second clock asynchronously with the first clock;

receiving update data in a memory from the processor during a first time period, the  
update data including at least destination data;

updating the updatable table asynchronously with the first clock, using at least some of the update data in the memory; and  
transmitting the time-multiplexed data onto the data link in accordance with data stored in the updatable table.

98. A method, as claimed in claim 97, wherein the step of updating comprises:  
sampling the second clock;  
providing the sampled second clock to a circuit whose output has a corresponding relationship to the rising edge of the second clock.

99. A method, as claimed in claim 97, further comprising the step of:  
waiting up to a predetermined maximum wait time before performing the step of receiving update data if fewer than a predetermined number of update words are contained in the update data.

100. A method, as claimed in claim 99, wherein the predetermined number of update words is equal to the number of words that can be stored in the memory.

101. A method, as claimed in claim 97, wherein the update data includes at least one control word, indicating a table update location, and at least one data word, including data to be stored at the update location.

102. A method, as claimed in claim 101, wherein the update data includes more data words than control words.

103. A method, as claimed in claim 102, further comprising the step of incrementing the control word by a first amount to provide a new table update location for a subsequent table update.

104. (amended) A method, as claimed in claim 103, wherein the first amount is programmable.

105. A method, as claimed in claim 97, wherein the update data includes a plurality of words, each of the plurality of words having at least one bit indicating whether the word is a control word or a data word.

106. A method, as claimed in claim 97, wherein the update data includes a plurality of words, each of the plurality of words having at least one bit indicating whether the word is the last data word of the update data.



107. A method, as claimed in claim 97, further comprising the step of notifying the processor when the table update is complete.

108. A method, as claimed in claim 107, wherein the step of notifying comprises sending an interrupt to the processor.

109. A method, as claimed in claim 107, wherein, after the processor has written the update data into the memory, the processor is prevented from writing further data into the memory until after the step of notifying.

110. A method, as claimed in claim 97, wherein the updatable table comprises a switch table.

111. A method, as claimed in claim 97, wherein the updatable table comprises a routing table.

112. A method, as claimed in claim 97, wherein the updatable table controls the routing of isochronous data, non-isochronous data, or a combination of isochronous data and non-isochronous data, on a bus.

113. A method, as claimed in claim 112, wherein the isochronous data comprises telephony data, video data, or a combination of telephony data and video data.

114. A method, as claimed in claim 112, wherein the non-isochronous data comprises packet data.

115. A method, as claimed in claim 112, wherein the non-isochronous data comprises Ethernet data.

116. A method, as claimed in claim 112, wherein the non-isochronous data comprises non-packet, non-isochronous data.

117. A method, as claimed in claim 112, wherein the non-isochronous data comprises ATM data.

118. A method, as claimed in claim 112, wherein the bus comprises a time division multiplexed bus.

119. A method, as claimed in claim 112, wherein the bus comprises a time slot interchange bus.

120. A method, as claimed in claim 112, wherein the bus comprises a bus for carrying ATM, SONET or 1394 data.

121. A method, as claimed in claim 112, wherein the bus connects multiple hubs in the system.

122. A method, as claimed in claim 97, wherein the memory comprises a register.

123. (amended) A method, as claimed in claim 97, wherein the memory comprises a random access memory (RAM).

124. A method, as claimed in claim 97, wherein the memory comprises a multi-port memory.

125. A method, as claimed in claim 97, wherein update data is transferred to the memory in the form of a burst.

126. A method, as claimed in claim 97, wherein the updatable table operates synchronously with the second clock, the second clock having a different frequency than the first clock.

127. A method, as claimed in claim 97, wherein the second clock comprises a network reference clock.

128. A method, as claimed in claim 127, wherein the network reference clock comprises a WAN reference clock.

129. A method, as claimed in claim 127, wherein the network reference clock comprises a LAN reference clock.

130. A method, as claimed in claim 97, wherein the updatable table controls a hub in the system.

131. A method, as claimed in claim 130, wherein the hub comprises a PBX.

132. A method, as claimed in claim 130, wherein the hub includes multiple LAN connections.

133. A method, as claimed in claim 130, wherein the hub includes multiple isochronous switching devices.

134. A method, as claimed in claim 130, wherein the hub includes multiple Ethernet connections.

135. A method, as claimed in claim 130, wherein the hub is coupled to multiple nodes.